SECTION 05512

ARCHITECTURAL STEEL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes: Architectural ornamental steel-framed stairs, including:
   1. Custom steel stairs with treads and platforms filled with precast concrete: Steel stair number 6 Central Lab Office building.

B. Related Sections:
   1. Division 3 Section "Plant Precast Architectural Concrete" for precast concrete fill for stair treads and platforms.
   2. Division 5 Section "Ornamental Handrails and Railings" for ornamental metal handrails and railings. Provide ornamental handrails and railings manufactured by the manufacturer of the Architectural Steel Stairs specified in this section.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal stairs capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of metal stairs.
   1. Treads and Platforms of Metal Stairs: Capable of withstanding a uniform load of 100 lbf/sq. ft. or a concentrated load of 300 lbf on an area of 4 sq. in., whichever produces the greater stress.
   2. Stair Framing: Capable of withstanding stresses resulting from loads specified above in addition to stresses resulting from railing system loads.
   3. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

1.3 SUBMITTALS

A. Product Data: For metal stairs and the following:
   1. Paint products.

B. Shop Drawings: Show fabrication and installation details for metal stairs. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Arrange for metal stairs specified in this Section to be fabricated and installed by the same firm.

B. Engineer Qualifications: A structural engineer who is legally qualified to practice in Tennessee and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal stairs that are similar to those indicated for this Project in material, design, and extent.

C. Fabricator Qualifications: A firm experienced in producing metal stairs similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.5 COORDINATION

A. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide custom steel stairs manufactured by one of the following:
1. American Stair
2. Couturier Iron Craft, Inc.
3. Stair Design, Inc.

2.2 FERROUS METALS

A. Metal Surfaces: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
1. Provide solid steel rods, bars, shapes and plates indicated on Drawings.

C. Stainless Steel: Perforated metal; Sheet, Strip, Plate, and Flat Bar: ASTM A 240, Type 304.

D. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

E. Uncoated, Cold-Rolled Steel Sheet: Commercial quality, complying with ASTM A 366/A 366M; or structural quality, complying with ASTM A 611, Grade A, unless another grade is required by design loads.

F. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Machine Screws: ASME B18.6.3.

D. Plain Washers: Round, carbon steel, ASME B18.22.1.

E. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2.4 PAINT

A. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:
   1. SSPC-SP 6 "Commercial Blast Cleaning."

B. Priming:
   1. Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by manufacturer to provide a dry film thickness of not less than 3.0 mils. Use priming methods that result surfaces. in full coverage of joints, corners, edges, and exposed
      a. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
   2. Epoxy Prime Paint: Epoxy primer applied at dry film thickness of 3 mils.
      a. Carboline: 893 Hi Build Epoxy.
      b. Tnemec: 66 Hi Build Epoxy-Polyamide Primer.
   3. Finish coat of paint, semi-gloss pearlescent finish (mica flakes) urethane in color matching the aluminum PVDF finish, as selected by Architech), refer to Section 09900 for finish coat.

2.5 PRECAST CONCRETE FILL

A. Precast Concrete Materials and Properties: Comply with requirements in Division 3 Section "Plant Precast Architectural Concrete" for precast treads and platforms.

2.6 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
   1. Join components by welding, unless otherwise indicated on Drawings.
   2. Use connections that maintain structural value of joined pieces.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
   1. Architectural class.

C. Shop Assembly: Assemble stairs in shop to greatest extent possible to minimize field splicing and assembly. Clearly mark units for assembly and coordinated installation.

D. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Shear and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces.

E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Weld connections to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Weld exposed corners and seams continuously, unless otherwise indicated.
   5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

H. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.7 STEEL-FRAMED STAIRS

A. Stair Framing: Fabricate built-up stringers of structural-steel plates, as indicated on Drawings. Provide closures for exposed ends of stringers.
   1. Provide stringers of rolled channel shapes where indicated on Drawings.

B. Construct platforms of structural-steel channel headers and miscellaneous framing members as indicated. Weld headers to stringers; weld framing members to stringers and headers. Fabricate and join so bolts are not exposed on finished exposed surfaces.

C. Metal Risers, Subtread Pans, and Subplatforms: Provide metal risers, subtread pans and subplatforms to receive precast architectural concrete treads and landings as indicated on Drawings.
   1. Form to configurations shown from steel sheet of thickness necessary to support indicated loads, but not less than 0.0677 inch.
   2. Steel Sheet for metal pans: Uncoated cold-rolled steel sheet.
   3. Stainless Steel Perforated Risers: Provide perforated stainless steel; perforations pattern and size indicated on Drawings.
   4. Directly weld metal pans to stringers; locate welds on side of subtreads to be concealed by tread. Do not weld risers to stringers.
   5. Shape metal pans to include nosing.
   6. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

      a. Smooth Soffit Construction: Construct subplatforms with smooth soffits.

2.8 ORNAMENTAL STAIR HANDRAILS AND RAILINGS

A. Comply with requirements in Division 5 Section "Ornamental Handrails and Railings" for handrails and railings.

2.9 FINISHES

A. Comply with NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal stairs after assembly.

C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed products:
   1. SSPC SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Apply shop primer to prepared surfaces of metal stair components. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Provide anchorage devices and fasteners for securing metal stairs to construction. Include threaded fasteners for concrete and masonry inserts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION 05512